



In my application number 08 /477 704 titled "Reciprocating Elements and Associated Fluid Flows" filed on June 7 1995 under group art 3747, WHAT I Mitja Victor Hinderks CLAIM IS:

1 -389 Claims 1 to 389 are deleted.

390. (Thrice amended) A (rotatable shaft, a mechanism) and device for the working of fluids, said device comprising a housing with a cylinder assembly mounted therein, at least one component assembly mounted to reciprocate within said cylinder assembly, said cylinder assembly having at least one first working surface and said component assembly having at least one second working surface such that said working surfaces in operation are approximately parallel and co-axial and variably spaced, said surfaces partly defining at least one fluid working chamber varying in capacity during an operating cycle of said device, means deployed between said cylinder assembly and said component assembly to cause said component assembly and said second surface to rotate while reciprocating relative to said cylinder assembly and said first surface, (said component assembly being linked to said shaft by said mechanism, said mechanism causing said shaft to only rotate while said component assembly reciprocates and rotates.) said device including structure which defines a volume substantially surrounding said cylinder assembly in operation said volume functioning as a passage for fluids worked by said device.

Figs 116 - 140.

Text p 37 ln 12 - p 47 ln 18.

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391. The device of claim 390, said cylinder assembly being rotatably mounted in said housing.

Figs 116 - 140;

Text p 37 ln 12 - p 47 ln 18

392. A reciprocating combustion engine, including a fuel delivery system, an exhaust emission control system and the device of claim 390.

Figs 116 - 140; 149 - 280.

Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

393. The engine of claim 392, said cylinder assembly being rotatably mounted in said housing.

Figs 116 - 140; 149 - 280.

Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

394. A compound engine comprising the engine of claim 392, at least one other engine of another type.

and a (special) second means for transferring work between each of said at least two engines.

Figs 4 - 13; 75 - 80.

Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

395. *The compound engine of claim 394, wherein said (special) second means include the flow of heated gases.*

Figs 4 - 13; 75 - 80.

Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

396. *The device of claim 390, wherein said component assembly defines a passage for fluids worked by said device.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

397. *Claim 397 is deleted.*

398. *The engine of claim 392, wherein said component assembly defines a passage for fluids worked by said device.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

399. *The (engine) device of claim (392) 390, (including structure which defines a volume at least partially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device) wherein said component assembly defines a passage for fluids worked by said device.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

400. *The engine of claim 398, including filamentary material within said passage.*

Figs 149 - 153; 171 - 228.

Text p 49 ln 7 - p53 end.

401. *The engine of claim (399) 392, including filamentary material within said volume.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

402. The engine of claim 400, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

403. The engine of claim 401, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

404. The device of claim 390, including insulating material at least partially encasing said device, for purpose of reducing heat loss from said fluid working chamber.

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

405. The engine of claim 392, including insulating material at least partially encasing said engine, for purpose of reducing heat loss from said fluid working chamber.

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

406. The device of claim 390, wherein said cylinder assembly is formed at least in part of ceramic material.

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

407. The device of claim 390, wherein said component assembly is formed at least in part of ceramic material.

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

408. The device of claim 390, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.

Figs 71.

Text p 22 ln 31 - p 23 ln 5.

409. *The device of claim 390, wherein said cylinder assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 68 - 70; 78 and 79; 136 - 140.

Text p 25 ln 25 - end; p 43 ln 7 - p 47 ln 18.

410. *The device of claim 409, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

411. *The device of claim 390, wherein said component assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 136 - 140.

Text P 43 ln 7 - p 47 ln 18.

412. *The device of claim 411, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

413. *The engine of claim 392, wherein said cylinder assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

414. *The engine of claim 392, wherein said component assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

415. *The engine of claim 413, including at least one electrical circuit within said ceramic material.*

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

416. *The engine of claim 414, including at least one electrical circuit within said ceramic material.*

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

417. *The rotatable shaft, mechanism and device of claim (390) 552, in which said mechanism comprises a series of splines slidably mounted on another series of splines.*

Text p 33 ln 5 - 10.

418. *The rotatable shaft, mechanism and device of claim (390) 552 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.*

Figs 103 and 104.

Text p 33 ln 5 - ln 15.

419. *The rotatable shaft, mechanism and device of claim (390) 552, wherein said mechanism comprises at least one bellows.*

Figs 107 and 108.

Text p 33 ln 5 - p 34 ln 4.

420. *The rotatable shaft, mechanism and device of claim (390) 552, wherein said mechanism comprises at least one hinged element.*

Figs 105 and 106.

Text p 33 ln 5 - p 34 ln 4.

421. *The device of claim 390, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

422. *The device of claim 421, wherein said guide is a roller of truncated conical configuration.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

423. *The engine of claim 392, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

424. The engine of claim 423, wherein said guide is a roller of truncated conical configuration.
 Figs 98 - 102; 109 - 116; 119 - 128.
 Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.
425. The device of claim 390, wherein said fluid working chamber is at least partially of toroidal configuration.
 Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.
 Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9;
 p37 ln 12 - p 47 ln 18.
426. The engine of claim 392, wherein said fluid working chamber is at least partially of toroidal configuration
 Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.
 Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9;
 p37 ln 12 - p 47 ln 18.
427. The engine of claim 393, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.
 Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.
 Text p 11 ln 13 - end; p 24 ln 22 - end; p 41 ln 29 - p 47 ln 18.
428. The device of claim 390, wherein said component assembly consists of one monolithic piece.
 Figs 68 -70; 77 - 80; 87 -95.
 Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.
429. The device of claim 390, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.
 Figs 68 -70; 77 - 80; 87 -95.
 Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.
430. The engine of claim 392, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.
 Figs 68 -70; 77 - 80; 87 -95.
 Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.
431. A rotatable shaft, a mechanism and device for the working of fluids, said device comprising a

housing with a cylinder assembly mounted therein, at least one component assembly mounted to reciprocate within said cylinder assembly, said cylinder assembly having at least one first working surface and said component assembly having at least one second working surface such that said working surfaces in operation are approximately parallel and co-axial and variably spaced, said surfaces partly defining at least one fluid working chamber varying in capacity during an operating cycle of said device, means deployed between said cylinder assembly and said component assembly to cause said component assembly and said second surface to rotate while reciprocating relative to said cylinder assembly and said first surface, said component assembly being linked to said shaft by said mechanism, said mechanism causing said shaft to only rotate while said component assembly reciprocates and rotates, said cylinder assembly being rotatably mounted in said housing.

Figs 116 - 140.

Text p 37 ln 12 - p 47 ln 18.

432. *A reciprocating internal combustion engine, including a fuel delivery system, an exhaust emissions control system and the device of claim 431.*

Figs 116 - 140; 149 - 280.

Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

433. *A compound engine comprising the engine of claim 432, at least one other engine of another type and a (special) second means for transferring work between each of said at least two engines.*

Figs 4 - 13; 75 - 80.

Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

434. *The compound engine of claim 433, wherein said (special) second means include the flow of heated gases.*

Figs 4 - 13; 75 - 80.

Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

435. *The device of claim 431, wherein said component assembly defines a passage for fluids worked by said device.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

436. *The device of claim 431, including structure which defines a volume (at least partially) substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

437. *The engine of claim 432, wherein said component assembly defines a passage for fluids worked by said device.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

438. *The engine of claim 432, including structure which defines a volume (at least partially) substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

439. *The engine of claim 437, including filamentary material within said passage.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

440. *The engine of claim 438, including filamentary material within said volume.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

441. *The engine of claim 439, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

442. *The engine of claim 440, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

443. *The device of claim 431, including insulating material at least partially encasing said device, for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

444. *The engine of claim 432, including insulating material at least partially encasing said engine, for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

445. *The device of claim 431, wherein said cylinder assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

446. *The device of claim 431, wherein said component assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

447. *The device of claim 431, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

Figs 71.

Text p 22 ln 31 - p 23 ln 5.

448. *The device of claim 431, wherein said cylinder assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 68 - 70; 78 and 79; 136 - 140.

Text p 25 ln 25 - end; p 43 ln 7 - p 47 ln 18.

449. *The device of claim 448, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

450. *The device of claim 431, wherein said component assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 136 - 140.

Text P 43 ln 7 - p 47 ln 18.

451. *The device of claim 450, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

452. *The engine of claim 432, wherein said cylinder assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

453. *The engine of claim 432, wherein said component assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

454. *The engine of claim 452, including at least one electrical circuit within said ceramic material.*

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

455. *The engine of claim 453, including at least one electrical circuit within said ceramic material.*

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

456. *The rotatable shaft, mechanism and device of claim 431, in which said mechanism comprises a series of splines slidably mounted on another series of splines.*

Text p 33 ln 5 - 10.

457. *The rotatable shaft, mechanism and device of claim 431 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.*

Figs 103 and 104.

Text p 33 ln 5 - ln 15.

458. *The rotatable shaft, mechanism and device of claim 431, wherein said mechanism comprises at least one bellows.*

Figs 107 and 108.

Text p 33 ln 5 - p 34 ln 4.

459. *The rotatable shaft, mechanism and device of claim 431, wherein said mechanism comprises at least one hinged element.*

Figs 105 and 106.

Text p 33 ln 5 - p 34 ln 4.

460. *The device of claim 431, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

461. *The device of claim 460, wherein said guide is a roller of truncated conical configuration.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

462. *The engine of claim 432, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

463. *The engine of claim 462, wherein said guide is a roller of truncated conical configuration.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

464. *The device of claim 431, wherein said fluid working chamber is at least partially of toroidal configuration.*

Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.

*Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9;
p37 ln 12 - p 47 ln 18.*

465. *The engine of claim 432, wherein said fluid working chamber is at least partially of toroidal configuration.*

Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.

*Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9;
p37 ln 12 - p 47 ln 18.*

466. *The device of claim 431, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

467. *The engine of claim 432, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

468. *The device of claim 431, wherein said component assembly consists of one monolithic piece.*

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

469. *The device of claim 431, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

470. *The engine of claim 432, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

471. *(Thrice amended) A (rotatable shaft, a mechanism and) device for the working of fluids, said device comprising a housing with a cylinder assembly mounted therein, at least one component assembly mounted to reciprocate within said cylinder assembly, said cylinder assembly having at least one working surface and said component assembly having at least one second working surface such that said working surfaces in operation are approximately parallel and co-axial and variably spaced, said surfaces partly defining at least one fluid working chamber varying in capacity during an operating cycle of said device, each of said surfaces being of endless wave-like configuration to permit and limit said component assembly and said second surface to both reciprocate and rotate relative to said cylinder assembly and said first surface, (said mechanism causing said shaft to only rotate while said component assembly reciprocates and rotates.) said device including structure which defines a volume substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.*

Figs 98 - 102; 109 - 140.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 47 ln 18.

472. The device of claim 471, said cylinder assembly being rotatably mounted in said housing.

Figs 116 - 140; 149 - 280.

Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

473. A reciprocating internal combustion engine, including a fuel delivery system, an exhaust emissions control system and the device of claim 471.

Figs 116 - 140; 149 - 280.

Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

474. The engine of claim 473, said cylinder assembly being rotatably mounted in said housing.

Figs 116 - 140; 149 - 280.

Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

475. A compound engine comprising the engine of claim 473, at least one other engine of another type and a (special) second means for transferring work between each of said at least two engines.

Figs 4 - 13; 75 - 80.

Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

476. The compound engine of claim 475, wherein said (special) second means include the flow of heated gases.

Figs 4 - 13; 75 - 80.

Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

477. The device of claim 471, wherein said component assembly defines a passage for fluids worked by said device.

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

478. Claim 478 is deleted.

479. The engine of claim 473, wherein said component assembly defines a passage for fluids worked by said device.

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

480. The (engine) device of claim 471, (including structure which defines a volume at least partially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.) wherein said component assembly defines a passage for fluids worked by said device.
481. The engine of claim (480) 472, including filamentary material within said passage.
Figs 68 -70; 90 - 95; 129 - 140
Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.
482. The engine of claim (480) 473, including filamentary material within said volume.
Figs 68 -70; 90 - 95; 129 - 140
Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.
483. The engine of claim 481, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.
Figs 68 -70; 90 - 95; 129 - 140
Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.
484. The engine of claim 482, wherein said filamentary material is catalytic to expedite reactions between portions of the working fluids.
Figs 68 -70; 90 - 95; 129 - 140
Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.
485. The device of claim 471, including insulating material at least partially encasing said device for purpose of reducing heat loss from said fluid working chamber.
Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.
Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.
486. The engine of claim 473, wherein said cylinder assembly is formed at least in part of ceramic material.
Figs 1; 136 - 140.
Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.
487. The device of claim 471, wherein said cylinder assembly is formed at least in part of ceramic material.
Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

488. *The device of claim 471, wherein said component assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

489. *The device of claim 471, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

Figs 71.

Text p 22 ln 31 - p 23 ln 5.

490. *The device of claim 471, wherein said cylinder assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 68 - 70; 78 and 79; 136 - 140.

Text p 25 ln 25 - end; p 43 ln 7 - p 47 ln 18.

491. *The device of claim 490, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

492. *The device of claim 471, wherein said component assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 136 - 140.

Text P 43 ln 7 - p 47 ln 18.

493. *The device of claim 492, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

494. *Claim 494 is deleted.*

495. *The engine of claim 473, wherein said component assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

496. *The engine of claim 494, including at least one electrical circuit within said ceramic material.*

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

497. *The engine of claim 495, including at least one electrical circuit within said ceramic material.*

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

498. *The rotatable shaft, mechanism and device of claim (471) 553, in which said mechanism comprises a series of splines slidably mounted on another series of splines.*

Text p 33 ln 5 - 10.

499. *The rotatable shaft, mechanism and device of claim (471) 553 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.*

Figs 103 and 104.

Text p 33 ln 5 - ln 15.

500. *The rotatable shaft, mechanism and device of claim (471) 553, wherein said mechanism comprises at least one bellows.*

Figs 107 and 108.

Text p 33 ln 5 - p 34 ln 4.

501. *The rotatable shaft, mechanism and device of claim (471) 553, wherein said mechanism comprises at least one hinged element.*

Figs 105 and 106.

Text p 33 ln 5 - p 34 ln 4.

502. *The device of claim 471, wherein said fluid working chamber is at least partially of toroidal configuration.*

Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.

*Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9;
p37 ln 12 - p 47 ln 18.*

503. *The engine of claim 473, wherein said fluid working chamber is at least partially of toroidal configuration.*

Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.

*Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9;
p37 ln 12 - p 47 ln 18.*

504. *The device of claim 472, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

505. *The engine of claim 474, wherein said housing comprises insulating material for purpose of reducing heat loss from said fluid working chamber.*

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

506. *The device of claim 471, wherein said component assembly consists of one monolithic piece.*

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

507. *The device of claim 471, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

508. *The engine of claim 473, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.*

509. *(Once amended) A (rotatable shaft, a mechanism and) device for the working of fluids, said device comprising a housing with a cylinder assembly mounted therein, at least one component mounted to reciprocate within said cylinder assembly, said cylinder assembly having at least one working surface and said component having at least one second working surface such that said working surfaces in operation are approximately parallel and co-axial and variably spaced, said surfaces partly defining at least one fluid working chamber varying in capacity during an operating*

cycle of said device, means deployed between said cylinder assembly and said component to cause said component and said second surface to rotate while reciprocating relative to said cylinder assembly and said first surface, (said mechanism causing said shaft to only rotate while said component assembly reciprocates and rotates,) said housing including substantial insulating material(.) for purpose of reducing heat loss from said fluid working chamber.

Figs 20 and 21; 68 - 70; 77 - 80; 116 - 140.

Text p 11 ln 13 - end; p 24 ln 22 - end; p 37 ln 12 - p 41 ln 18.

510. *The device of claim 509, said cylinder assembly being rotatably mounted in said housing.*

Figs 116 - 140.

Text p 37 ln 12 - p 47 ln 18.

511. *A reciprocating internal combustion engine, including a fuel delivery system, an exhaust emissions control system and the device of claim 509.*

Figs 116 - 140; 149 - 280.

Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

512. *The engine of claim 511, said cylinder assembly being rotatably mounted in said housing.*

Figs 116 - 140; 149 - 280.

Text p 37 ln 12 - p 47 ln 18; p 49 ln 7 - p 80 ln 7.

513. *A compound engine comprising the engine of claim 511, at least one other engine of another type, and a (special) second means for transferring work between each of said at least two engines.*

Figs 4 - 13; 75 - 80.

Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

514. *The compound engine of claim 513, wherein said (special) second means include the flow of heated gases.*

Figs 4 - 13; 75 - 80.

Text p 8 ln 1 - p 10 ln 6; p24 ln 12 - end.

515. *The device of claim 509, wherein said component assembly defines a passage for fluids worked by said device.*

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

516. The device of claim 509, including structure which defines a volume (at least partially) substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.

517. The engine of claim 511, wherein said component assembly defines a passage for fluids worked by said device.

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

518. The engine of claim 511, including structure which defines a volume (at least partially) substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.

519. The engine of claim 517, including filamentary material within said passage.

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

520. The engine of claim 518, including filamentary material within said volume.

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

521. The engine of claim 519, wherein said filamentary material is catalytic to expedite reactions between elements of the working fluids.

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

522. The engine of claim 520, wherein said filamentary material is catalytic to expedite reactions between elements of the working fluids.

Figs 68 -70; 90 - 95; 129 - 140

Text p 22 ln 17 - ln 30; p 28 ln 28 - p 30 ln 9; p 41 ln 23 - p 47 ln 18.

523. The (device) engine of claim (509) 511, including secondary insulating material at least partially encasing said device for purpose of reducing heat loss from said fluid working chamber.

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

524. *The engine of claim 511, wherein said cylinder assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

525. *The device of claim 509, wherein said cylinder assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

526. *The device of claim 509, wherein said component assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

527. *The device of claim 509, wherein said component assembly has a first distinct surface and said cylinder assembly a second distinct surface, in operation said distinct surfaces being approximately constantly spaced from and approximately parallel to one another, at least one of said distinct surfaces defining at least one manufactured depression in operation wholly fillable by fluids worked by said device.*

Figs 71.

Text p 22 ln 31 - p 23 ln 5.

528. *The device of claim 509, wherein said cylinder assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 68 - 70; 78 and 79; 136 - 140.

Text p 25 ln 25 - end; p 43 ln 7 - p 47 ln 18.

529. *The device of claim 528, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

530. *The device of claim 509, wherein said component assembly is comprised of portions including at least one element, each said element holding said portions together and being pre-loaded under tension.*

Figs 136 - 140.

Text P 43 ln 7 - p 47 ln 18.

531. *The device of claim 530, wherein said element is of tubular form.*

Figs 140.

Text p 45 ln 7 - p46 ln 27.

532. *The engine of claim (511) 512, wherein said cylinder assembly is formed at least in part of ceramic material.*

Figs 1; 136 - 140.

Text p 6 ln 26 - p 7 ln 24; p43 ln 7 - p 47 ln 18.

533. *The engine of claim 511, wherein said component assembly is formed at least in part of ceramic material.*

534. *The engine of claim 532, including at least one electrical circuit within said ceramic material.*

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

535. *The engine of claim 533, including at least one electrical circuit within said ceramic material.*

Figs 267.

Text p 7 ln 25 - end; p 77 ln 13 - ln 28.

536. *The rotatable shaft, mechanism and device of claim (509) 554, in which said mechanism comprises a series of splines slidably mounted on another series of splines.*

Text p 33 ln 5 - 10.

537. *The rotatable shaft, mechanism and device of claim (509) 554 including rollers, in which said mechanism comprises a series of flanges slidably mounted on another series of flanges, said two series of flanges being separated by said rollers.*

Figs 103 and 104.

Text p 33 ln 5 - ln 15.

538. *The rotatable shaft, mechanism and device of claim (509) 554, wherein said mechanism comprises at least one bellows.*

Figs 107 and 108.

Text p 33 ln 5 - p 34 ln 4.

539. *The rotatable shaft, mechanism and device of claim (509) 554, wherein said mechanism comprises at least one hinged element.*

Figs 105 and 106.

Text p 33 ln 5 - p 34 ln 4.

540. *The device of claim 509, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

541. *The device of claim 540, wherein said guide is a roller of truncated conical configuration.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

542. *The engine of claim 511, wherein said means comprise a guide restrained by a single endless substantially sinusoidal path.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

543. *The engine of claim 542, wherein said guide is a roller of truncated conical configuration.*

Figs 98 - 102; 109 - 116; 119 - 128.

Text p 30 ln 10 - p 33 ln 4; p 34 ln 5 - p 37 ln 24; p 38 ln 21 - p 41 ln 28.

544. *The device of claim 509, wherein said fluid working chamber is at least partially of toroidal configuration.*

Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.

*Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9;
p37 ln 12 - p 47 ln 18.*

545. *The engine of claim 511, wherein said fluid working chamber is at least partially of toroidal configuration.*

Figs 20 and 21; 68 - 70; 77 - 80; 87 - 95; 116 - 140.

*Text p 11 ln 13 - end; p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9;
p37 ln 12 - p 47 ln 18.*

546. *The (device) engine of claim (510) 473, wherein said housing comprises insulating material for*

purpose of reducing heat loss from said fluid working chamber.

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

547. The engine of claim 512, (wherein said housing comprises insulating material.) including secondary insulating material at least partially encasing said device for purpose of reducing heat loss from said fluid working chamber.

Figs 20 and 21; 68 - 70; 77 - 80; 129 - 140.

Text p 11 ln 13 - end; p24 ln 22 - end; p41 ln 29 - p41 ln 18.

548. The device of claim 509, wherein said component assembly consists of one monolithic piece.

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

549. The device of claim 509, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

550. The engine of claim 511, wherein said component assembly has a projecting portion which at least partly penetrates (said segment) portion of said cylinder assembly during at least part of said cycle.

Figs 68 -70; 77 - 80; 87 -95.

Text p 24 ln 22 - end; p 24 ln 12 - end; p 28 ln 2 - p 30 ln 9.

551. The engine of claim 511, including structure which defines a volume substantially surrounding said cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device.

552. The device of claim 390 including a mechanism and a rotatable shaft, said shaft linked to said component assembly by said mechanism such that said shaft only rotates while said component assembly reciprocates and rotates.

553. The device of claim 471 including a mechanism and a rotatable shaft, said shaft linked to said component assembly by said mechanism such that said shaft only rotates while said component assembly reciprocates and rotates.

554 *The device of claim 509 including a mechanism and a rotatable shaft, said shaft linked to said component assembly by said mechanism such that said shaft only rotates while said component assembly reciprocates and rotates.*

END OF CLAIMS

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